PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : D06F 58/20, D06M 23/02 | A1

(11) International Publication Number: WO 96/09430

(43) International Publication Date: 28 March 1996 (28.03.96)

(21) International Application Number: PCT/IB95/00792

(22) International Filing Date: 6 September 1995 (06.09.95)

(30) Priority Data:
08/308,392 19 September 1994 (19.09.94) US
08/510,487 2 August 1995 (02.08.95) US

(71)(72) Applicant and Inventor: MOSER, Scott, A. [CA/CA]; 3038 Hamilton Road, R.R. #2, Dorchester, Ontario N0L 1G0 (CA).

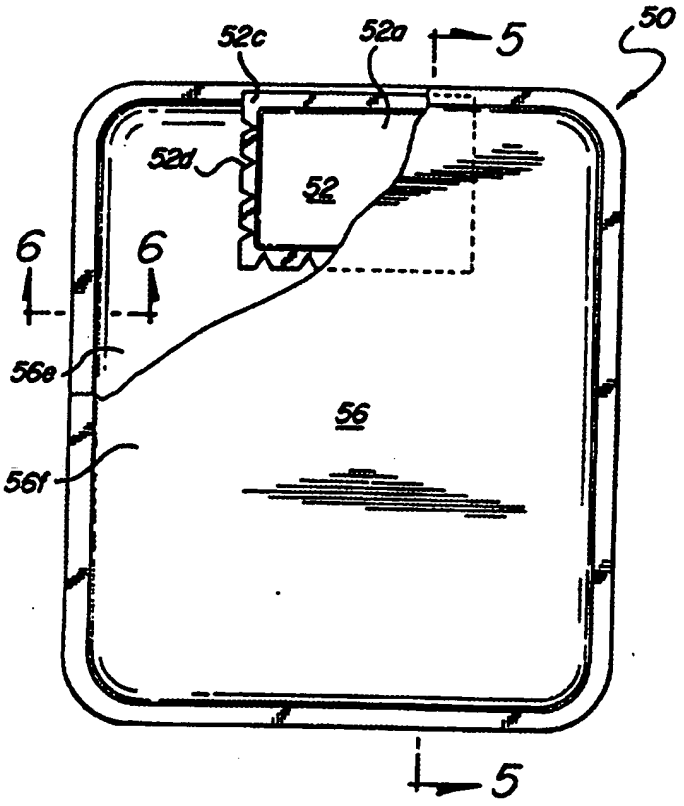
(81) Designated States: CA, JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
With amended claims.

(54) Title: ARTICLE AND METHOD FOR TREATING FABRICS IN A CLOTHES DRYER

(57) Abstract

Treatment of fabrics in a clothes dryer is accomplished using an article that is added to the dryer along with a load of fabrics to be dried. In one embodiment, the article comprises a bladder formed from a waterproof, moisture-permeable material that releases vaporous water and/or a fabric chemical agent that provides anti-static and/or other treatment of the fabrics in the dryer. The bladder can be formed from a waterproof material having a permeability that allows gaseous exchange which moistens the exterior of the bladder and which increases near the end of the dryer cycle due to a pressure/temperature differential that results from the elevated temperatures that exist during the later portions of the dryer cycle. In a second embodiment, the article comprises a rupturable inner pouch containing a fabric chemical agent such as a stain protection product, and an outer pouch that encloses the inner pouch. The inner pouch is impermeable to the fabric chemical agent so that the chemical agent is confined until the inner pouch is ruptured. The outer pouch is permeable by the chemical agent and includes an outer absorbent layer that becomes saturated by chemical agent released after the inner pouch is ruptured. The inner pouch can be ruptured by compressive pressure applied just prior to the article being placed into the dryer or can be designed to rupture under the forces experienced during tumbling in the dryer.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CS	Czechoslovakia
CZ	Czech Republic
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakhstan
LI	Liechtenstein
LK	Sri Lanka
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SI	Slovenia
SK	Slovakia
SN	Senegal
TD	Chad
TG	Togo
TJ	Tajikistan
TT	Trinidad and Tobago
UA	Ukraine
US	United States of America
UZ	Uzbekistan
VN	Viet Nam

ARTICLE AND METHOD FOR TREATING FABRICS IN A CLOTHES DRYER

CROSS-REFERENCE

This application is a continuation-in-part of U.S. Serial No. 08/308,392 filed September 19, 1994, entitled "Article and Method for Treating Fabrics in a Clothes Dryer."

FIELD OF THE INVENTION

This invention relates in general to articles and methods for treating fabrics in an automatic clothes dryer and, more particularly, to an article placed within the dryer for fabric treatment and/or control of static electricity.

BACKGROUND OF THE INVENTION

As is now well known, fabrics can be treated within a clothes dryer using an article containing chemical agents for such purposes as fabric softening, scenting, and preventing build-up of static electricity. The chemical agents can be incorporated into the article in various ways. For example, the chemical agents can be: provided on or throughout a flexible substrate, as in U.S. Patent No. 3,944,694 issued March 16, 1976 to A.R. McQueary; impregnated or absorbed into a sponge or other open-cell foam material, as in U.S. Patent Nos. 3,870,145 issued March 11, 1975 to W.G. Mizuno, 4,073,996 issued February 14, 1978 to W.T. Bedenk et al., and 5,040,311 issued August 20, 1991 to J. Roy;

or contained within a permeable pouch, as in U.S. Patent Nos. 4,004,685 issued January 25, 1977 to W.G. Mizuno et al., 4,223,029 issued September 16, 1980 to D.G. Mahler et al., and 4,839,076 issued June 13, 1989 to K.W. Willman et al.

Triboelectric build-up of static electricity within a clothes dryer occurs near the end of the drying cycle, when the moisture contained in the tumbling fabrics has been substantially removed. Earlier in the drying cycle, this moisture permits conduction of electric charge from the fabrics so that static electricity is substantially nonexistent. In the articles disclosed in the above-noted patents, control of static electricity is achieved using one or more various chemical agents that are transferred from the article to the fabrics tumbling within the dryer. These anti-static agents are incorporated into the article in one or more of the various ways mentioned above. Some of these schemes are designed for a single application. See, for example, the above-noted patent to McQueary. Others permit the article to be used along with more than one dryer load. For example, in the above-noted patent to Mizuno, anti-static agents can be impregnated into a sponge in a heat softenable form so that heat from the dryer causes softening and subsequent transference of some of the chemical agent onto the fabrics present in the dryer. However, none of these anti-static articles are designed to have the anti-static or other chemical agent replenished for continued use of the article. Thus, even the

re-usable articles have a somewhat limited useful life.

It is also known to add laundry additives to fabrics within a laundry washing machine for such purposes of fabric softening. See, for example, U.S. Patent Nos. 4,260,054 issued April 7, 1981 to B.H. Bory et al., 4,882,917 issued November 28, 1989 to E.A. Mizusawa et al., and 5,176,275 issued January 5, 1993 to S.S. Bowie. These patents disclose various arrangements for enabling a timed release of the laundry additives. Bory et al. utilize a rupturable pouch that is attached to the washing machine's central agitator and that breaks under the centrifugal force experienced during the spin cycle. Mizusawa et al. utilize a folded packet of wash additive that falls during the spin cycle from a special dispenser mounted on the central agitator. Bowie utilizes a container that is inserted into the wash with the fabrics and that breaks in response to the temperature change experienced when the washing machine cycles from warm or hot wash water to colder rinse water.

SUMMARY OF THE INVENTION

The present invention provides an article and method for treating fabrics within a clothes dryer. In accordance with one aspect of the invention, an article and method are provided for controlling the build-up of static electricity within a clothes dryer by utilizing a liquid impervious, moisture-permeable bladder that contains a volume of water and that, when heated within the dryer, permits

moisture to permeate the bladder and moisten its outer layer to an extent sufficient to discharge static electricity from fabrics coming into contact with the moistened bladder. Thus, control of static electricity is achieved without the use of chemical anti-static agents, as are typically utilized by the prior art. If desired, chemical anti-static agents can be utilized in lieu of or in addition to the use of water to control build-up of static electricity. The bladder can be filled with a water-absorbing material, such as an open-cell foam to help disperse the water or other anti-static agent evenly throughout the bladder.

In accordance with another aspect of the present invention, a waterproof, moisture-permeable material is used that has a moisture vapor transmission rate that increases with increasing temperature so that more moisture is delivered by the bladder at the higher temperatures existing near the end of a dryer cycle, when build-up of static electricity begins. The material can be selected in accordance with typical dryer temperatures so that significant amounts of moisture are not released until the later portions of the dryer cycle. Thus, moisture is released primarily during that portion of the dryer cycle in which it is needed. Expanded polytetrafluoroethylene (ePTFE) is one of many microporous membranes that can be used to provide this temperature dependent moisture vapor transmission rate.

In accordance with yet another aspect of the present invention, the bladder could provide other

chemical agents for such purposes as fabric softening, scenting, wrinkle control, stain treatment, mildew resistance, moth resistance, and others. One or more of these agents could be provided by the bladder in any of a variety of ways; for example, by being placed within the bladder, incorporated into the bladder, or incorporated onto the outer layer of the bladder. The agents could be provided in any of the various known forms, including heat softenable compositions impregnated into the open-cell foam or otherwise located within the bladder. Microencapsulation or friction between the chemical agent and the bladder can be used to provide a timed release of the chemical agent so that the agent can be dispensed from the bladder over a large number of dryer loads.

The present invention also provides an article and method for treating fabrics with a fabric chemical agent that is initially held in an inner pouch that can be ruptured to release the chemical agent for permeation through an outer pouch and into contact with the fabrics. The inner pouch is impermeable to the fabric chemical agent and can be preweakened at one or more locations so that it can be ruptured by squeezing or other such compressive force. Alternatively, the inner pouch can be constructed from a material having a thickness that is sufficiently thin that the material breaks along one edge due to compressive pressure. The outer pouch is permeable by the chemical agent and preferably includes at least one inner, non-absorbent permeable layer and an absorbent outer layer that becomes saturated with

fabric chemical agent that has permeated the inner layer or layers of the outer pouch.

In accordance with another aspect of the invention, the pouches can be formed from opposed sections of material that are heat sealed or otherwise bonded about their periphery. Additionally, the inner pouch can be secured to the outer pouch along one of the peripheral edges of each of the pouches using the same adhesive used to seal the two sections of the outer pouch together.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred exemplary embodiment of the present invention will hereinafter be described in conjunction with the appended drawings, wherein like designations denote like elements, and:

Figure 1 is a front view of a preferred embodiment of the dryer article of the present invention;

Figure 2 is a cross-sectional view taken along the 2-2 line of Fig. 1;

Figure 3 is a graph showing the relationship between temperature and relative humidity in a dryer for a typical dryer load and dryer cycle;

Figure 4 is a front view of a second preferred embodiment of the dryer article of the invention, with a portion of its outer pouch shown

cut away to reveal the construction and location of its inner pouch;

Figure 5 is a cross-sectional view taken along the 5-5 line of Fig. 4; and

Figure 6 is an enlarged, partial cross-sectional view taken along the 6-6 line of Fig. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1, a dryer article embodying the present invention is shown and is designated generally at 10. Article 10 comprises a bladder 12 having a fill spot 14 and airflow vents 16. Fill spout 14 is used to fill bladder 12 with water and, if desired, other fabric chemical agents, as will be described below. If desired, article 10 can include airflow vents 16 that permit direct airflow through article 10 without communication with the interior of bladder 12 so that article 10 will not significantly obstruct the exhausting of air from a dryer in which article 10 is used. As will be described below, bladder 12 is formed from a waterproof, moisture-permeable material. Control of the build-up of static electricity on fabrics tumbling within a dryer is achieved in general and in accordance with the present invention by placing a quantity a water within bladder 12, placing bladder 12 into the clothes dryer along with other fabrics to be dried, and operating the dryer in the usual manner to dry the fabrics. During the drying cycle, water vapor within bladder 12 will permeate bladder 12 and moisten its outer layer resulting in

the surface of bladder 12 becoming electrically conductive. Thus, bladder 12 will discharge static electricity built-up on the fabrics with which it comes into contact, yet will not leave the fabrics feeling wet or damp.

It will be appreciated that the term "water", as used in connection with the present invention, does not refer to distilled water, but rather to electrically conductive water, such as tap water obtained through a standard household water faucet.

Referring now also to Fig. 2, article 10 will be described in greater detail. Bladder 12 is formed from three layers, an outer layer 18, an intermediate layer 20, and an inner layer 22. It includes an open-cell foam 24 that fills the volume within bladder 12. Foam 24 can be a reticulated foam or other water-absorbing material, such as is used for making common household sponges. Outer layer 18 and inner layer 22 can both be fluid-permeable; that is, permeable to both gases and liquids. Intermediate layer 20 is permeable to gases, including water vapor, but not to liquids. Thus, bladder 12 can hold a volume of water and will only loose that water through vaporization of the water and subsequent permeation through the wall of bladder 12. Additional moisture-permeable layers can be included, as desired. Intermediate layer 20 can be an expanded polytetrafluoroethylene (ePTFE), such as described in U.S. Patent Nos. 3,953,566 issued April 27, 1976 to R.W. Gore, 4,194,041 issued March 18, 1980 to R.W. Gore et al., and 5,026,513 issued Jun 25, 1991 to W.D. House et al., the

complete disclosures of which are hereby incorporated by reference. As is known, such materials are commercially available and are sold under the trademark Gore-tex by W.L. Gore & Associates, Inc. of Elkton, Maryland.

As is also known, such materials are commercially available that are less permeable to moisture at lower temperatures than at higher temperatures. Moreover, these materials can be manufactured to have a certain moisture vapor transmission rate at a certain temperature. For example, materials are commercially available that are moisture-permeable at room temperature (24°C), such as are used in waterproof, breathable clothing, but that have even a greater permeability (while remaining waterproof) at a temperature above 24°C. These materials are available from W.L. Gore & Associates, Inc., as well as from many other manufacturers of microporous membranes. The advantage of these types of waterproof, moisture-permeable materials is that the particular material utilized for layer 20 can be preselected in accordance with typical dryer temperatures to provide a bladder that releases moisture primarily near the end of the dryer cycle, when it is most needed. Also, regardless of whether or not the moisture-permeable material has a temperature dependent moisture vapor transmission rate, the greater rate of evaporation and the buildup of positive pressure within the bladder at the elevated temperatures existing near the end of the dryer cycle will help increase the amount of moisture released.

Outer layer 18 is a layer of blended materials, such as cotton, nylon, rayon, and/or other materials capable of absorbing or wicking enough moisture from intermediate layer 20 to permit conduction of electric charge through or along the surface of layer 18. Outer layer 18 also protects intermediate layer 20 from wear due to such things as friction with other fabrics. Preferably, layer 18 is made from a material that permits conduction of charge over its surface even in the absence of surface moisture. Inner layer 22 is a woven interface between intermediate layer 20 and foam 24. It comprises an absorbent cloth or other material that permits wicking of the water or other liquid within bladder 12 so that substantially all of the surface of intermediate layer 20 is in contact with moisture, even if the volume of liquid is concentrated at another location of bladder 12 due to gravity, centrifugal forces, or otherwise. Hydrophilic materials, as defined in the above-noted U.S. Patent No. 4,194,041, can be used for inner layer 22. Intermediate layer 20 can be adhesively bonded to either layer 18 or 22, or both, using a moisture-permeable adhesive. Techniques and adhesives for such bonding are described in U.S. Patent No. 4,925,732 issued May 15, 1990 to K.R. Driskill et al., the disclosure of which is hereby incorporated by reference. Intermediate layer 20 can be attached to layers 18 or 22 or both in other ways, such as are described in the above-noted U.S. Patent No. 4,194,041.

Bladder 12 can be formed from opposed sections of layers 18, 20, and 22 that are die-cut

either individually or, if any of the layers are to be bonded, after a pre-formed laminate is made from those layers. Foam 24 can also be die cut and placed between the opposed sections. Then, layer 20 and either layer 18, 22, or both are sealed about their periphery and at airflow vents 16 to provide a waterproof enclosure. These seams can be formed in any suitable manner using conventional techniques, such as heat or ultrasonic welding, gluing, or sewing. It will of course be appreciated that any other suitable method can be used to manufacture bladder 12 using intermediate layer 20 and foam 24.

Although air flow vents 16 are shown in the illustrated embodiment, it will be appreciated that they can be eliminated if desired to increase the surface area of bladder 12 that comes in contact with the fabrics tumbling in the dryer. This increase in surface area helps maximize the efficiency of bladder 12.

Fill spout 14 is used to permit re-filling of bladder 12 after a substantial amount of water has permeated out through the walls of bladder 12, as will occur after repeated uses of article 10. Fill spout 14 can be attached to bladder 12 using known techniques. It can include an inner annular flange 26 and an outer annular flange 28 that capture layers 18, 20, and 22 therebetween. Fill spout 14 can include a recessed protective insert 30 having apertures 32 in its sidewalls to prevent the introduction into bladder 12 of materials other than fluids. A cap 34 fits into insert 30 to prevent

escape of fluid through fill spout 14. Fill spout 14, including insert 30 and cap 34 can be formed as a unitary structure. Preferably, cap 34 is formed from a relatively soft plastic to minimize the noise made by cap 34 when contacting the dryer's drum during tumbling of article 10 within the dryer. Fill spout 14 can be attached to bladder 12 in a location, such as that shown, so as to help prevent overfilling of bladder 12 that could result in pressure being generated within bladder 12 when it is heated within the dryer. It is expected that by re-filling bladder 12 when needed, article 10 could be used with up to one thousand or more dryer loads.

Although water is preferred, other anti-static liquids that, as a vapor, will permeate bladder 12 can be used. Such anti-static liquids can include electrically conductive liquids other than water, or anti-static agents dissolved in water or some other solvent. Alternatively, an agent can be incorporated onto, into, or within bladder 12 that, together with an electrically non-conductive liquid within bladder 12, causes outer layer 18 to become electrically conductive. This could be accomplished using, for example, distilled water that permeates intermediate layer 20 and combines with an agent held by outer layer 18 to create an ionic solution in outer layer 18.

Referring now to Fig. 3, the relationship between temperature and relative humidity within a dryer is shown for a typical dryer load and dryer cycle time. As this graph indicates, at the beginning of the dryer cycle, the temperature is

relatively low (e.g., 20°C) and the relative humidity is high (due to the large amounts of water contained in the fabrics). As the dryer cycle progresses, the temperature gradually increases and the relative humidity falls, as the water contained in the fabrics evaporates and is removed by exhausting air from the dryer. Triboelectric generation of static electricity on the clothes begins as the relative humidity falls below fifty to sixty percent. This is indicated at "S" along the time axis. Thereafter, the build-up of static electricity increases as more and more humidity is removed from within the dryer.

It will be noticed from the graph of Fig. 3 that, during the part of the dryer cycle in which triboelectric charging is present, the temperature is greater than at the earlier portions of the dryer cycle. The present invention can take advantage of the existence of this increase in temperature by utilizing a liquid-impervious, moisture-permeable material that is substantially moisture-impermeable at 24°C and the lower temperatures encountered during the earlier portions of the dryer cycle, but that is substantially moisture-permeable at the higher temperatures encountered during the later portions of the dryer cycle. In this way, moisture is lost by bladder 12 only when needed to control the build-up of static electricity and not during periods of non-use or during the earlier portions of the dryer cycle when additional moisture is neither needed nor desirable. Preferably, the temperature above which layer 20 provides sufficient moisture to layer 18 to control static electricity is within the

range of 36°C to 60°C, with layer 20 having a pore size of at least .02 microns at temperatures above 36°C. As mentioned above, such materials are commercially available. The particular temperature at which layer 20 begins providing sufficient moisture will of course depend upon such factors as the size of article 10 and the temperatures generated by the dryer with which article 10 is used. Preferably, this temperature is selected so that article 10 can be advantageously used with any of a large number of different household dryers, including dryers that provide automatic control by switching off when the temperature within the dryer exceeds about 57-60°C.

In addition to or in lieu of controlling the build-up of static electricity, article 10 can be used to provide other fabric chemical agents. For example, rather than providing static control, article 10 can be used to treat fabrics with a stain protection product. Preferably, the stain protection product utilized permeates bladder 12 in a vaporous form while the fabrics are still damp. Also, it is preferable that a stain protection product is used that will cure relatively quickly after transference to the fabrics within the dryer. This can be accomplished by using a stain protection product that cures at the higher temperatures experienced during the later portions of the dryer cycle. Optionally, a stain protection product that cures at room temperature can be utilized so that it can be applied while the dryer is set to air tumbling or some other no heat setting.

The fabric chemical agents used can be added into bladder 12 via fill spout 14 or incorporated in any of the various known ways mentioned above and described in the above-noted patents. For example, a solid or semi-solid bar or cake of fabric chemical agent can be used with friction between the chemical agent and the inside surface of bladder 12 being relied upon to release the chemical agent from the surface of the bar or cake. Another way to incorporate these agents into article 10 is by microencapsulation of the agents within water soluble or heat softenable spheres. The spheres can be impregnated into foam 24 or otherwise provided on or within bladder 12. Then, heat, water, friction, or any other means could be used within the dryer to dissolve the outer coating and release the fabric chemical agent which, assuming proper relative sizes of the chemical agent and pores of layer 20, would then permeate bladder 12 and transfer onto the fabrics within the dryer. Further, the thicknesses of the coatings or the composition of the coatings could be varied so that all of the fabric chemical agent is not released during the same load. This would permit fabric chemical agents to be provided by article 10 without them having to be replenished each time the water within bladder 12 was replenished. Suitable techniques for microencapsulation are well known. If one or more fabric chemical agents are used, then arrangements such as are disclosed in the above-noted U.S. Patent No. 4,194,041 can be used to account for changes in the permeation of water through layer 20 due to changes in surface tension of the water.

Microencapsulation can also be used to release a chemical after a predetermined amount of time (e.g., two years) that reacts with a coating on bladder 12 or, preferably, the inside of cap 34, to produce a color change or other indication that replacement of article 10 is needed. As will be appreciated, this indication can be provided in other ways, such as by designing the hinge of cap 34 to break after a predetermined number of openings of article 10.

Referring now to Figs. 4 and 5, a second dryer article 50 embodying the present invention will be described. In general, article 50 is especially adapted to be included in the dryer along with a load of fabrics for the purpose of releasing a fabric chemical agent that conditions or otherwise treats the fabrics. It includes a rupturable inner pouch 52 that contains a quantity of fabric chemical agent 54 and an outer pouch 56 that completely encloses inner pouch 52. Outer pouch 56 is permeable by fabric chemical agent 54 so that once inner pouch 52 is ruptured, the fabric chemical agent can permeate outer pouch 56 and wet its exterior surface. Tumbling of article 50 with the fabrics in the dryer causes transference of the fabric chemical agent from article 50 to the fabrics.

Inner pouch 52 is made from a material that is impermeable to the fabric chemical agent contained therein. Suitable materials include foils, resinous materials, plastics, or any combination of these. Inner pouch 52 can be formed

from two rectangular, opposed sections 52a and 52b of material that are heat sealed or otherwise secured to each other about their periphery. This provides pouch 52 with an outer, peripheral seal 52c. Techniques for sealing sections 52a and 52b together to encapsulate a quantity of chemical agent 54 therebetween are well known to those skilled in the art. Preferably, inner pouch 52 is hermetically sealed to prevent evaporation of its contents and to thereby provide an extended shelf life for article 50.

As mentioned above, inner pouch 52 is rupturable to permit release of the fabric chemical agent during the drying cycle. Preferably, pouch 52 is manufactured to be rupturable in response to compressive pressure such as would be exerted thereon by squeezing inner pouch 52 and outer pouch 56 together in one's hand. For this purpose, the outer peripheral seal 52c of inner pouch 52 is preweakened by a plurality of notches 52d that extend around three of the pouch's four edges. Notches 52d permit inner pouch 52 to be designed so as to rupture when subjected to a predetermined level of compressive force and permit rupturing of the pouch at more than one location to help insure that pouch 52 empties completely. Although a number of notches 52d are shown, it will be appreciated that only one such notch is needed to make inner pouch 52 rupturable in response to compressive pressure. Other means of preweakening inner pouch 52 will be known to those skilled in the art. For example, inner pouch 52 can be preweakened so as to rupture under the centrifugal forces and impacts

experienced during tumbling in the dryer. Optionally, other means of releasing chemical agent 54 can be used. For example, the foil or other material used to make inner pouch 52 can be selected to have a thickness that is sufficiently thin that compressive pressure breaks the foil along one side of pouch 52, near peripheral seal 52c. In one such embodiment, inner pouch 52 can be formed from a lamination of two polypropylene films that are bonded together using a catalytic adhesive. The outer ply can consist of 1.2 mil biaxially oriented polypropylene film with the inner ply consisting of a .90 mil biaxially oriented polypropylene core. These two films are then bonded together by a press using an M-397 polyurethane adhesive. Pouch 52 can be formed from these laminations by heat-sealing two opposed sections of lamination at 250°F, 20 psi and 450 to 500 grams per inch for three-fourths of a second. In yet another embodiment, inner pouch 52 can be sealed using a heat responsive adhesive that separates at the temperatures achieved during the normal course of the drying cycle. Furthermore, any combination of these arrangements for making pouch 52 rupturable can be utilized and various other such means for releasing the fabric chemical agent will become apparent to those skilled in the art.

Outer pouch 56 is used to contain fabric chemical agent 54 released from inner pouch 52 and to provide a quick, yet steady and uniform transference of the chemical agent to the fabrics within the dryer. This provides as much cure time as possible and allows the chemical agent to

completely absorb into the fabrics and wick to the center of the core of the material from which the fabric is made. For this reason outer pouch 56 is preferably formed from a material that provides a restricted, but sustained release of the chemical agent. In the illustrated embodiment, a composite material (i.e., a material having a plurality of different layers) is used, although it will be appreciated that outer pouch 56 can be made from a single layer of suitable material.

Fig. 6 shows a preferred construction of the composite material used for outer pouch 56. In general, pouch 56 preferably includes at least one inner layer of non-absorbent woven or perforated material and an outer layer of absorbent material that becomes saturated with and holds the fabric chemical agent released from inner pouch 52. In particular, outer pouch 56 can include an innermost non-absorbent layer 56a of perforated plastic film that is adhered by a thin, porous layer 56b of hot melt glue or other adhesive to a second non-absorbent layer 56c of polyester fibers which is in hydraulic contact with an outermost, absorbent layer 56d of densely matted wood pulp fibers. Layers 56c and 56d can be permanently connected together by hydraulic compression. A suitable composite material for outer pouch 56 can be one that includes inner perforated film layer 56a and that is otherwise similar to that available from duPont under the trademark Sontara. It will of course be appreciated that other materials can be used for constructing outer pouch 56 and providing a saturated, wet exterior surface. For example,

cotton and other blends of absorbent materials can be used for the outermost layer of pouch 56. Optionally, a non-absorbent outer layer of, for example, polyester fibers can be used if it provides sufficient wicking of the chemical agent for transference to the fabrics.

Fabric chemical agent 54 released from inner pouch 52 will first come into contact with innermost layer 56a which, although permeable, will provide a restriction to the free flow of chemical agent therethrough. The non-absorbent polyester fiber layer 56c provides further restriction to the flow of chemical agent. The absorbent outer layer 56d absorbs and becomes saturated with the chemical agent that has permeated layers 52a-52c. It substantially retains the chemical agent and provides a wet surface from which chemical agent is thereafter transferred by direct contact to the fabrics in the dryer. As will be appreciated, by controlling the release of chemical agent in this manner, the tumbling within the dryer of article 50 with the other fabrics provides a relatively uniform distribution of the chemical agent to the surfaces of the fabrics.

Outer pouch 56 is formed in a manner similar to that of inner pouch 52. It is preferably constructed from two opposed, rectangular sections 56e and 56f of the composite material such that the perforated film layers 56a of each section are facing each other. The two sections 56e and 56f are then heat sealed or otherwise secured together about their periphery so that no appreciable amount of

chemical agent will flow between the two sections. Outer pouch 56 preferably has dimensions within the range of 6" x 6" to 8" x 8", with inner pouch 52 being somewhat smaller.

As shown in Figs. 4 and 5, the location of inner pouch 52 within outer pouch 56 can be fixed by securing the two pouches together. Preferably, this is accomplished by locating one of the peripheral edges of inner pouch 52 within the seal area of outer pouch 56 along one of its peripheral edges. Then, sealing of the two opposed sections 56e and 56f together simultaneously secures inner pouch 52 to outer pouch 56.

Article 50 can be used to provide any of a number of different types of fabric chemical agents 54, including stain protection products, anti-static agents, fabric softeners, and products that provide scenting, starching or other wrinkle control, mildew protection, or moth resistance. As will be known to those skilled in the art, the viscosity or consistency of fabric chemical agent 54 can be varied as desired to obtain the desired level of saturation and retention in absorbent outer layer 56d of outer pouch 56. For example, chemical agent 54 can be a milky substrate stain conditioner, such as FC-1860 or the like, manufactured by 3M. It may also be provided as a semi-solid paste that could soften or even melt at the elevated temperatures existing within the dryer. Optionally, chemical agents can be utilized that are applied and, if necessary, can cure while the dryer is operated on an air tumble or other no-heat setting.

To use article 50, inner pouch 52 is first ruptured to release the fabric chemical agent by squeezing or otherwise applying compressive pressure to the outer and inner pouches. Thereafter, article 50 is placed in the clothes dryer with one or more fabrics to be dried or air tumbled. The dryer is then operated to treat the fabrics with the fabric chemical agent by permeation of the chemical agent through the outer pouch and into contact with the fabrics. Thereafter, article 50 can be removed along with the fabrics and utilized in another environmentally friendly application.

It will thus be apparent that there has been provided in accordance with the present invention an article and method for treating fabrics within a dryer which achieves the aims and advantages specified herein. It will of course be understood that the foregoing description is of a preferred exemplary embodiment of the invention and that the invention is not limited to the specific embodiment shown. Various changes and modifications will become apparent to those skilled in the art. For example, outer pouch 56 can have a re-sealable opening so that it could be re-used simply by replacing the empty, ruptured inner pouch with a new one. Any suitable type of re-closable seal could be used, such as those used by plastic bags sold under the trademark Ziploc. This would also allow the user to vary the amount of chemical agent released by placing either multiple or larger inner pouches into outer pouch 56 for larger loads or by placing either a single or smaller pouch into outer pouch 56 for smaller loads. This would also permit the user

to apply different types of fabric chemical agents to the fabrics during the same tumbling cycle. All such variations and modifications are intended to come within the spirit and scope of the appended claims.

What is claimed is:

1. An article for tumbling in a clothes dryer with a bundle of fabrics to release and treat the fabrics with a chemical agent, comprising:

a rupturable inner pouch;

a fabric chemical agent contained within said inner pouch;

a sealed outer pouch enclosing said inner pouch;

wherein said inner pouch comprises a material that is impermeable to said fabric chemical agent and said outer pouch comprises a material that is permeable by said fabric chemical agent, whereby rupturing of said inner pouch will permit said fabric chemical agent to contact and permeate said outer pouch to thereby release said fabric chemical agent.

2. An article as defined in claim 1, wherein said outer pouch includes an absorbent layer.

3. An article as defined in claim 2, wherein said absorbent layer comprises an outer layer of said outer pouch and wherein said outer pouch further comprises a non-absorbent inner layer that is permeable to said fabric chemical agent.

4. An article as defined in claim 3, wherein said non-absorbent layer comprises a perforated film.

5. An article as defined in claim 1, wherein said outer pouch is formed from opposed sections of a composite material that includes an absorbent layer and a non-absorbent layer, each of which is permeable by said fabric chemical agent, and wherein said opposed sections are sealed together along their periphery.

6. An article as defined in claim 1, wherein said inner pouch is preweakened at one or more locations about its periphery, whereby said inner pouch is rupturable by compressive pressure exerted on said inner pouch.

7. An article as defined in claim 1, wherein said outer pouch includes a re-sealable opening, whereby empty, ruptured inner pouches can be removed and replaced by new inner pouches.

8. An article as defined in claim 1, wherein said inner pouch comprises opposed sections of material secured together about one or more peripheral edges by a seal and wherein said material has a thickness selected relative to the strength of said seal such that compressive pressure applied to

said pouch causes said inner pouch to break along said one or more peripheral edges near said seal.

9. An article as defined in claim 1, wherein said fabric chemical agent is a stain protection product.

10. An article for tumbling in a clothes dryer with a bundle of fabrics to release and treat the fabrics with a chemical agent, comprising:

a liquid-impermeable, rupturable inner pouch having at least one peripheral edge and constructed to rupture at one or more locations about its periphery;

a fabric chemical agent substantially filling said inner pouch; and

a sealed outer pouch formed from opposed sections of material that contains an absorbent layer and a non-absorbent layer, each of which are permeable by said fabric chemical agent;

said outer pouch being sealed about its periphery and having at least one outer peripheral edge along which said opposing sections are secured together;

said inner pouch being enclosed within said outer pouch and having its one peripheral edge

secured between said opposed sections at said outer peripheral edge of said outer pouch.

11. A method of making an article for treating fabrics within a clothes dryer with a fabric chemical agent, comprising the steps of:

(a) providing a first material that is impermeable to the fabric chemical agent,

(b) enclosing a quantity of the fabric conditioner within a rupturable, impermeable pouch formed from said first material,

(c) providing a second material that is permeable by the fabric chemical agent, and

(d) forming an outer pouch from said second material that encloses said rupturable pouch.

12. The method of claim 11, further comprising the step of preweakening said inner pouch such that it is rupturable upon compressive pressure being exerted thereon.

13. The method of claim 12, wherein said preweakening step further comprises notching said inner pouch at one or more locations about its periphery.

14. The method of claim 11, further comprising the step of forming said rupturable pouch from a material having a thickness selected to break along an edge of said rupturable pouch in response to compressive pressure.

15. The method of claim 11, wherein step (d) further comprises securing opposed sections of said second material together along a peripheral edge of said outer pouch and further comprising the step of securing said inner pouch to said outer pouch along said peripheral edge.

16. The method of claim 11, wherein step (c) further comprises providing a second material having an outer absorbent layer and an inner non-absorbent layer.

17. A method for treating fabrics within a clothes dryer, comprising the steps of:

(a) releasing a fabric chemical agent by rupturing an inner pouch that is impermeable to said fabric chemical agent and that is contained within an outer pouch that is permeable to said fabric chemical agent,

(b) placing said outer pouch into a clothes dryer along with one or more fabrics, and

(c) operating said dryer to treat said one or more fabrics with said fabric chemical agent by permeation of said fabric chemical agent through said outer pouch and into contact with said one or more fabrics.

18. The method of claim 17, wherein step (a) further comprises applying compressive pressure to said outer and inner pouch to rupture said inner pouch.

19. The method of claim 17, wherein step (a) further comprises rupturing said inner pouch in said dryer during operation of said dryer.

20. The method of claim 17, further comprises subsequent to step (a) the step of absorbing said fabric chemical agent into an outer layer of said outer pouch.

AMENDED CLAIMS
[received by the International Bureau on 12 March 1996 (12.03.96); original claims unchanged; new claims 21-47 added (12 pages)]

(c) operating said dryer to treat said one or more fabrics with said fabric chemical agent by permeation of said fabric chemical agent through said outer pouch and into contact with said one or more fabrics.

18. The method of claim 17, wherein step (a) further comprises applying compressive pressure to said outer and inner pouch to rupture said inner pouch.

19. The method of claim 17, wherein step (a) further comprises rupturing said inner pouch in said dryer during operation of said dryer.

20. The method of claim 17, further comprises subsequent to step (a) the step of absorbing said fabric chemical agent into an outer layer of said outer pouch.

21. An anti-static article for controlling build-up of static electricity within a clothes dryer, comprising:

a bladder defining a chamber adapted to hold a volume of water, said bladder comprising a moisture-permeable, waterproof material;

said waterproof material being substantially moisture-impermeable at 24°C;

a closeable fill spout on said bladder having an opening that permits fluidic communication with the chamber of said bladder; and

a water-absorbing material contained within said bladder;

whereby, when said bladder is filled with water and inserted into a clothes dryer, heat within the clothes dryer produces water vapor within said bladder and permits the water vapor to permeate said waterproof material, thereby decreasing the amount of static electricity within the clothes dryer.

22. The article of claim 21, wherein said waterproof material is substantially moisture-impermeable below 36°C.

23. The article of claim 21, wherein said waterproof material is substantially moisture-permeable above 60°C.

24. The article of claim 21, wherein said waterproof material comprises expanded polytetrafluoroethylene.

25. An article for controlling build-up of static electricity and for conditioning fabrics within a clothes dryer, comprising:

a bladder defining a chamber adapted to hold a volume of water, said bladder comprising a moisture-permeable, waterproof material;

a closeable fill spout on said bladder having an opening that permits fluidic communication with the interior of said bladder; and

a water-absorbing material contained within said bladder;

a fabric conditioning agent in the form of a plurality of quantities of said conditioning agent, each of said quantities being micro-encapsulated by a time release coating and being impregnated into said water-absorbing material; whereby, when said bladder is filled with water and inserted into a clothes dryer the conditioning agent of at least some of said quantities is released in the clothes dryer and heat within the clothes dryer produces water vapor within said bladder and permits the water vapor to permeate said material, thereby decreasing the amount of static electricity within the clothes dryer.

26. An anti-static article for controlling build-up of static electricity within a clothes dryer, comprising:

a bladder defining a chamber adapted to hold a volume of water, said bladder comprising a moisture-permeable, waterproof material;

a closeable fill spout on said bladder having an opening that permits fluidic communication with the interior of said bladder; and

a first water-absorbing material contained within said bladder;

a second water absorbing material comprising an absorbent, woven layer between said waterproof material and said first water-absorbing material; whereby, when said bladder is filled with water and inserted into a clothes dryer water is absorbed by said first water-absorbing material and heat within the clothes dryer produces water vapor within said bladder and permits the water vapor to permeate said waterproof material, thereby decreasing the amount of static electricity within the clothes dryer.

27. A method for controlling build-up of static electricity during drying of fabrics in a clothes dryer, comprising the steps of:

(a) providing a waterproof, moisture-permeable container that defines a chamber for holding a quantity of water, said container being substantially moisture-impermeable at room temperature,

(b) placing a quantity of water within said chamber,

(c) placing said container into a clothes dryer along with one or more fabrics, and

(d) operating said dryer to dry said fabrics.

28. An anti-static article for controlling build-up of static electricity within a clothes dryer, comprising:

a bladder defining a chamber adapted to hold a volume of water, said bladder comprising a moisture-permeable, waterproof material;

a closeable fill spout on said bladder having an opening that permits fluidic communication with the interior of said bladder; and

a water-absorbing material contained within said bladder;

an outer covering over said waterproof material comprising a blend of cotton and synthetic fiber and being capable of holding moisture that has permeated through said waterproof material;

whereby, when said bladder is filled with water and inserted into a clothes dryer, heat within the clothes dryer produces water vapor within said bladder and permits the water vapor to permeate said material, thereby decreasing the amount of static electricity within the clothes dryer.

29. A method for controlling build-up of static electricity during drying of fabrics in a clothes dryer comprising the steps of:

filling a container with a liquid consisting essentially of water,

placing the container in the dryer for tumbling with the fabrics, said container having at least one wall which includes a layer of porous material which is substantially impermeable to water below a first temperature and is substantially permeable to water vapor above the first temperature but impermeable to water at a temperature between said first temperature and a second higher temperature which is greater than the highest operating temperature of said dryer, said second temperature being sufficient to provide a layer of air adjacent said one wall having a humidity higher than the air beyond said layer and high enough to discharge static electricity from the fabrics which come into contact with said one wall while in the dryer.

30. A method for controlling build up of static electricity during drying of fabrics in a dryer and after they have been removed from the dryer and are being worn by a person, said method comprising the steps of:

filling a container with a liquid aqueous solution of an anti-stat chemical for deposit on the fabrics, placing the container in the

dryer for tumbling with the fabrics, said container having at least one wall which includes a layer of porous material which is substantially impermeable to the liquid aqueous solution below a first temperature and is substantially permeable to the vapor of the aqueous solution above the first temperature but impermeable to said liquid aqueous solution at a temperature between said first temperature and a second higher temperature which is greater than the highest operating temperature of said dryer, said second temperature being sufficient to provide a layer of air adjacent said one wall having a humidity higher than the air beyond said layer and the humidity in the dryer and high enough to discharge static electricity from the fabrics which come into contact with said one wall while in the dryer and to deposit a sufficient quantity of said anti-stat on the fabrics to prevent build up of static electricity on the fabrics after removal from the dryer and during wear of the fabrics by a person.

31. A method for controlling build up of static electricity during drying of fabrics in a clothes dryer comprising the steps of:

(a) filling a body with water, said body being of a material which holds water in liquid form over a temperature range extending from room temperature to at least 60° C and releases moisture vapor at a rate which increases with increasing temperature above room temperature,

(b) placing said body into a clothes dryer along with one or more wet fabrics,

(c) operating said dryer to dry said fabrics and tumble said body and the fabrics together in the dryer at a temperature which increases from a value above room temperature to about 60° C thereby forming a cloud of moisture vapor surrounding said body,

continuing operating said dryer until the relative humidity within the dryer from the wet fabric is decreased to below about sixty percent whereby triboelectric generation of static electricity on the fabrics commences, and further continuing operating said dryer to expose said fabric to the cloud of moisture vapor carried with said body during tumbling to locally increase the relative humidity at the surface of fabrics contacted by said body and thereby dissipate static electricity from said fabrics.

32. The method as defined in Claim 31 wherein said body comprises a bladder of an expanded polytetrafluoroethylene.

33. The method as defined in Claim 32 wherein said bladder is constructed of a porous expanded polytetrafluorethylene having a pore size at 60° C of greater than about 0.02 microns.

34. The method as defined in Claim 31 including the step of further continuing operating

said dryer until the static electricity is reduced in said fabrics to a point where static cling is substantially eliminated and the fabrics are softened thereby.

35. The article of Claim 21 wherein said bladder has a pair of spaced apart oppositely disposed walls which are joined together at the perimeter thereof, said bladder being separated into plural compartments and each compartment is separated from an adjacent compartment by a vent opening extending through the opposed walls of the bladder whereby air flow through the dryer may pass through said openings.

36. The article of Claim 25 wherein said time release coating is a water soluble coating.

37. The article of Claim 25 wherein said time release coating is a heat dissolvable coating.

38. The article of Claim 26 wherein;

said closeable fill spout includes a lid,

and means for producing an indication on said lid that the article should be replaced.

39. The article of Claim 38 wherein said means is time responsive means.

40. The article of Claim 39 wherein said time responsive means is a micro-encapsulated chemical for producing said indication.

41. An article for conditioning fabrics within a clothes dryer, comprising:

a bladder defining a chamber adapted to hold a volume of liquid, said bladder comprising a vapor-permeable, liquid proof material;

a closeable fill spout on said bladder and an opening that permits fluidic communication with the interior of said bladder;

an absorbent material contained within said bladder for absorbing liquid in said chamber;

a fabric conditioning agent, said agent being micro-encapsulated by a time release coating and being impregnated into said absorbent material;

said fabric conditioning agent being released by said coating after a predetermined time, said conditioning agent being vaporized by the heat of said dryer and having a vapor particle size small enough to permeate the material of said bladder at a predetermined temperature, whereby said article produces a controlled delivery of said conditioning agent during operation of said dryer.

42. An article for conditioning fabrics within a clothes dryer, comprising:

a bladder defining a chamber adapted to hold a volume of liquid, said bladder comprising a vapor-permeable, liquidproof material;

a closeable fill spout on said bladder and an opening that permits fluidic communication with the interior of said bladder for adding liquid thereto,

a plurality of bodies disposed in said chamber, each body containing a fabric conditioning chemical which is released in vapor form at the operating temperature of said dryer,

said liquid being vaporized at the operating temperature of said dryer,

whereby said article produces a controlled delivery of the vapors of the liquid and the chemical through said vapor-permeable, liquidproof material during operation of the dryer.

43. The article of Claim 42 wherein said bodies comprise said chemical being micro-encapsulated by a time released coating.

44. The article of Claim 26 wherein said second water absorbing material is electrically conductive over the surface of said layer.

45. The article of Claim 21 wherein said closeable fill spout comprises:

a body member extending through an opening in said bladder, said body member including inner and outer peripheral flanges retaining said waterproof material therebetween in the region surrounding said opening,

a passage extending through said body,

said cap being insertable into said body to close said passage,

said cap being unitary with said body and coupled thereto by a unitary hinge.

46. The article of Claim 45 wherein said cap is constructed of soft plastic.

47. The article of Claim 46 wherein said body includes a unitary cup-shaped member defining said passage and receiving said cap,

said passage extending into said cup-shaped member and through the lateral wall thereof.

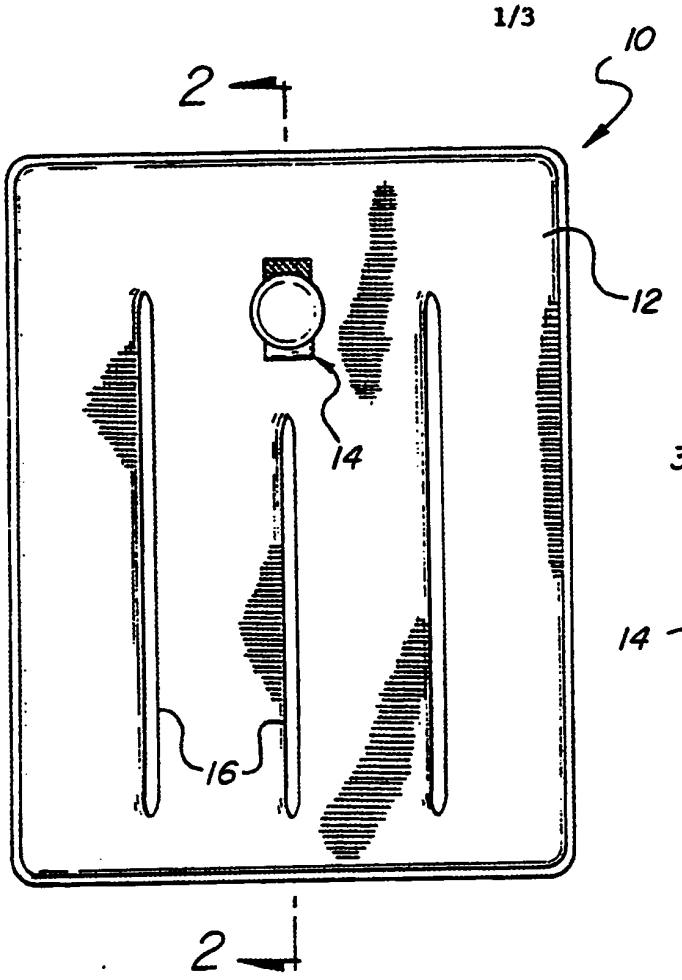


FIG-1

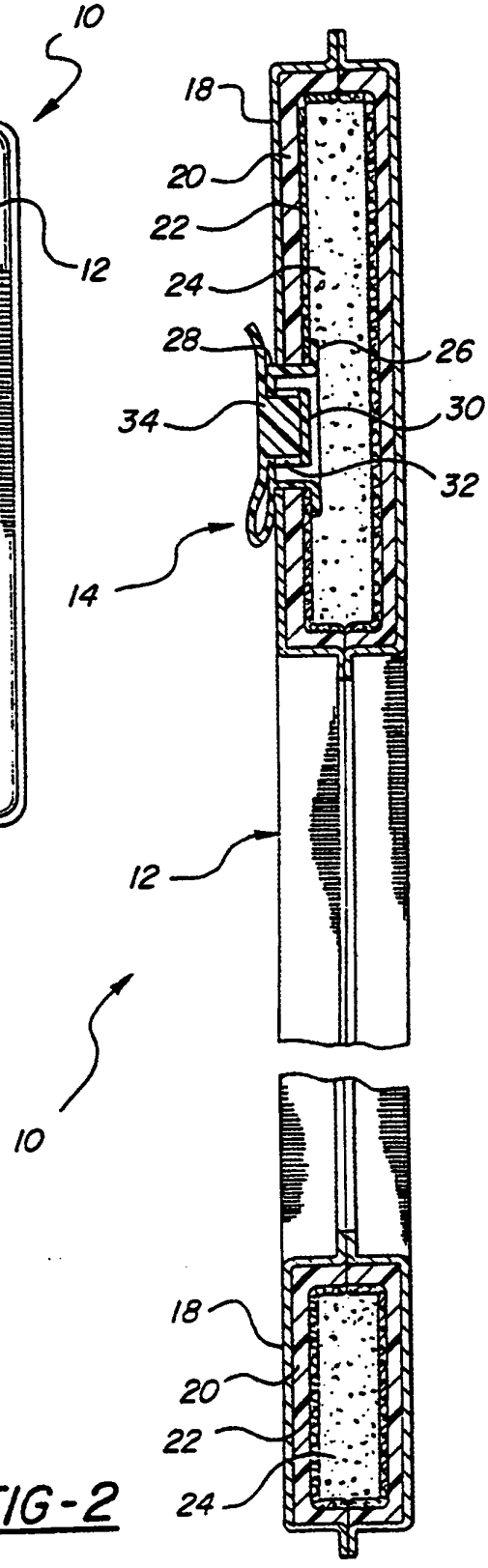


FIG-2

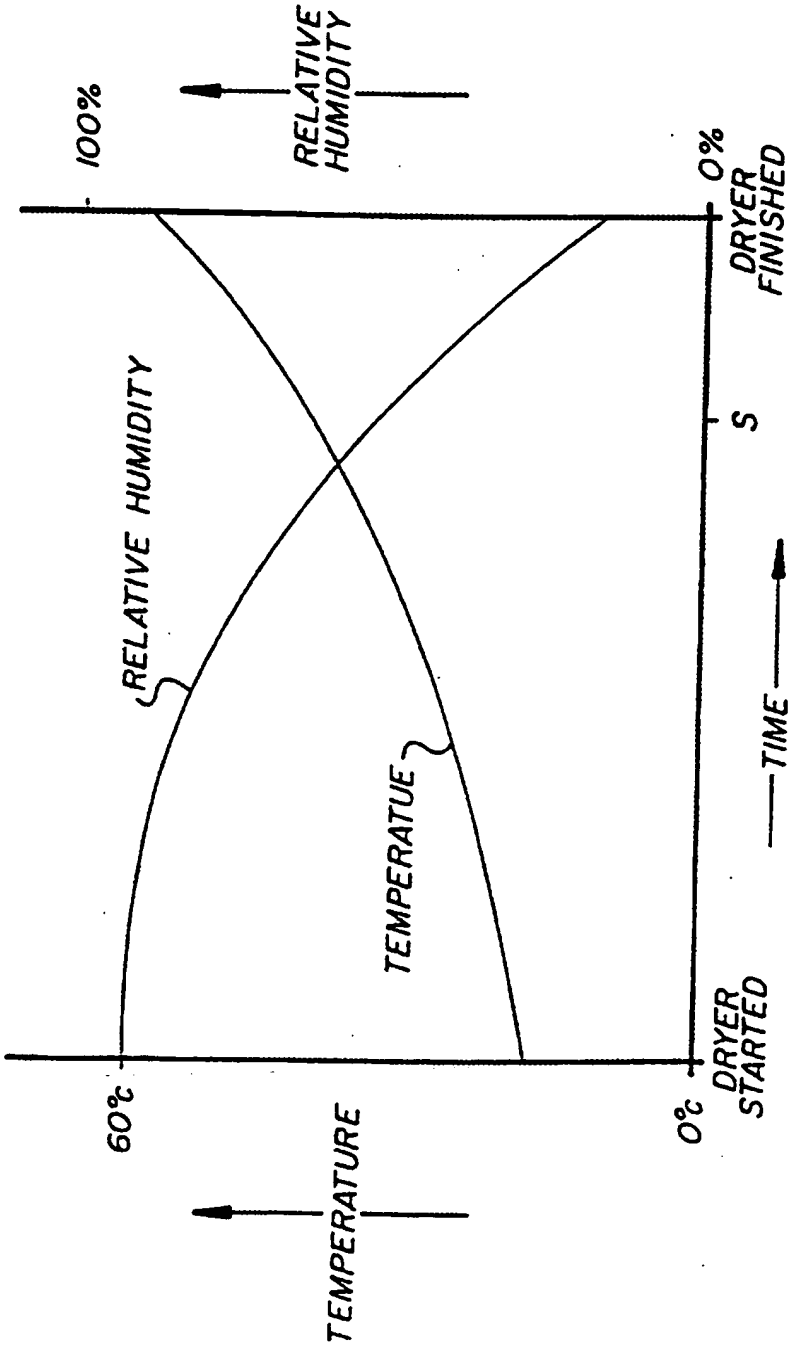

100%
RELATIVE HUMIDITY
0%
DRYER FINISHED
RELATIVE HUMIDITY
S
TIME
TEMPERATUE
60°c
TEMPERATURE
0°c
DRYER STARTED

FIG-3

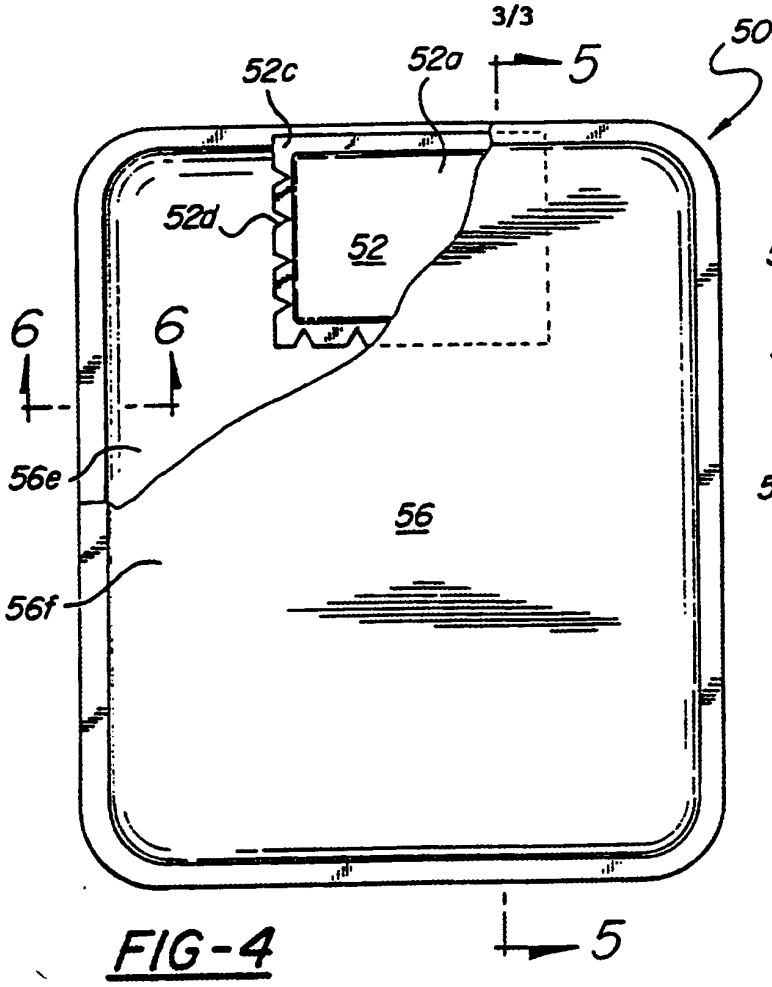


FIG-4

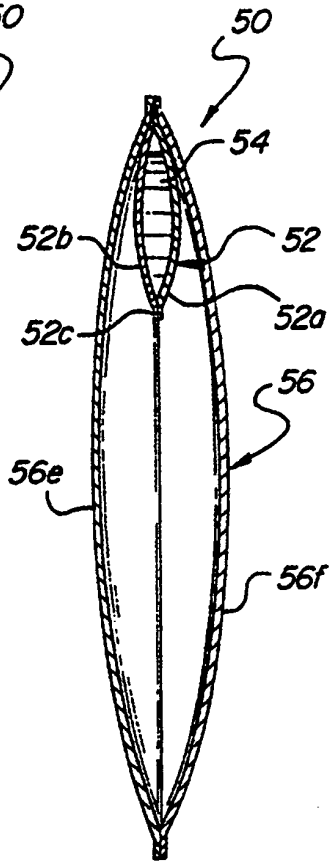
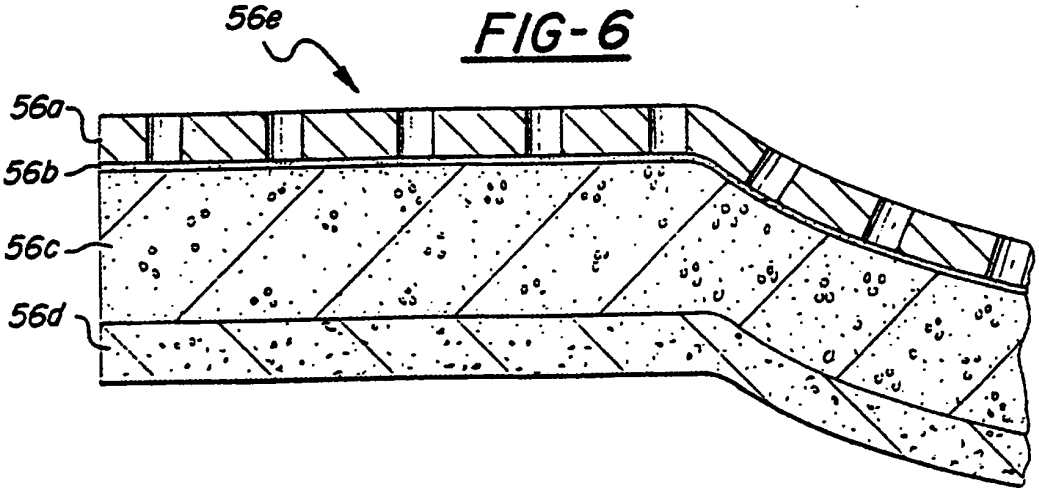


FIG-5

FIG-6



INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/IB 95/00792

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D06F58/20 D06M23/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D06F D06M C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	FR,A,2 307 076 (UNILEVER N.V.) 5 November 1976 see page 13, line 8 - page 14, line 5	1,11,17, 19 2
Y A	US,A,4 254 139 (T.C. HENDRICKSON; M. LIEBOWITZ) 3 March 1981	2 9,10
X A	FR,A,2 492 776 (JOH. A. BENCKISER GMBH) 30 April 1982 see page 2, line 12 - line 40	1,6,8, 11-14 10,17,18
X	EP,A,0 442 659 (SEIKEN KAGAKU CO., LTD.) 21 August 1991 see claims	1,6,11

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 December 1995	15.01.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	D Hulster, E

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Interv al Application No
PCT/IB 95/00792

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 132 726 (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 13 February 1985	

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/IB 95/00792

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
FR-A-2307076	05-11-76	GB-A-	1546763	31-05-79
		AU-B-	503721	20-09-79
		AU-B-	1263876	13-10-77
		BE-A-	840397	05-10-76
		CA-A-	1055432	29-05-79
		CH-A-	620255	14-11-80
		DE-A-	2614636	21-10-76
		JP-C-	1286819	31-10-85
		JP-A-	51123951	29-10-76
		JP-B-	60011154	23-03-85
		NL-A-	7603748	12-10-76
		US-A-	4014432	29-03-77
US-A-4254139	03-03-81	AR-A-	226196	15-06-82
		AT-B-	384235	12-10-87
		AU-B-	544034	16-05-85
		AU-B-	6554880	25-06-81
		BE-A-	886690	16-04-81
		CA-A-	1151809	16-08-83
		CH-A-	652771	29-11-85
		DE-A-	3046841	03-09-81
		FR-A,B	2472046	26-06-81
		GB-A,B	2066309	08-07-81
		JP-B-	1043074	18-09-89
		JP-C-	1561449	31-05-90
		JP-A-	56100100	11-08-81
		NL-A-	8006894	16-07-81
		SE-B-	450500	29-06-87
		SE-A-	8008478	21-06-81
FR-A-2492776	30-04-82	BE-A-	890800	15-02-82
		CH-A-	649749	14-06-85
		NL-A-	8103672	17-05-82
EP-A-442659	21-08-91	JP-A-	3231676	15-10-91
		US-A-	5458244	17-10-95
EP-A-132726	13-02-85	DE-A-	3326249	31-01-85
		DE-A-	3474432	10-11-88